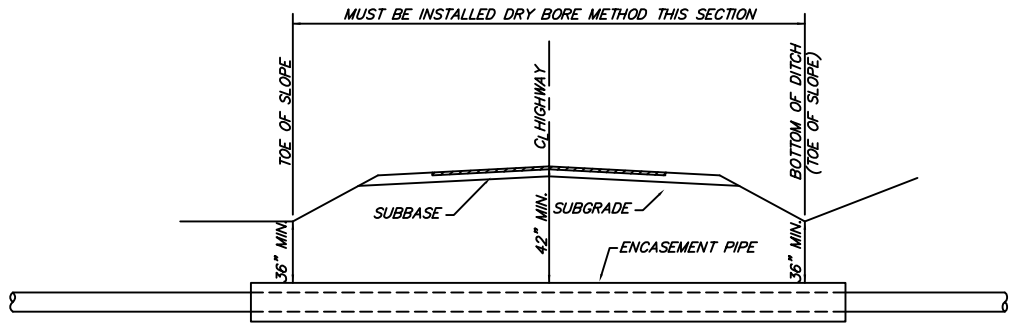


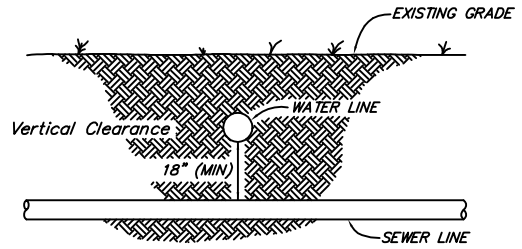
NOTES:

1. CASINGS SHALL HAVE A MINIMUM OF 3 FEET (36") COVER TO THE TOP OF THE PIPE BELOW THE PARALLEL DITCH LINES OR 3 1/2 FEET (42") BELOW THE TOP OF THE HIGHWAY SUBGRADE, WHICHEVER GIVES THE GREATER COVER. CASING SHOULD EXTEND THE FULL WIDTH OF THE RIGHT-OF-WAY BUT AS A MINIMUM MUST EXTEND SIX FEET BEYOND THE FLOWLINE OF THE PARALLEL DITCHES, TOE OF THE FORESLOPE, OR BACK OF CURBS AS APPLICABLE FOR THE ROADWAY SECTION.
3. BORES SHALL BE PAID FOR PER UNIT FOOT OF BORE WITH LINE INSIDE ENCASEMENT BEING PAID FOR SEPARATELY.
4. INSTALL STAINLESS STEEL BAND CASING INSULATORS (MODEL NO. 59 BY J-FOUR PIPELINE PRODUCTS) OR APPROVED EQUAL IN ACCORDANCE WITH MANUFACTURERS RECOMENDATIONS.
5. SEAL EACH END WITH ZIPPER END SEALS.
6. WATERLINE SHALL BE PLACED ON PVC SKIDS WITHIN ENCASEMENT PIPE.

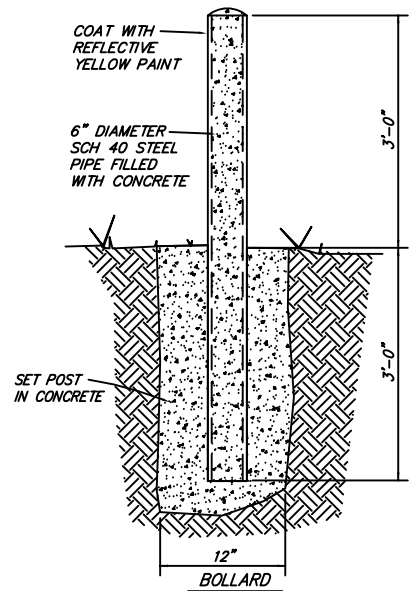
STANDARD ROADWAY CROSSING DETAIL
N.T.S.
WA.1.1

NOTES:

1. ALL WATER & SANITARY SEWER TRENCHES WHICH ARE UNDER THE PROPOSED STREETS MUST BE BACKFILLED AS SHOWN ON THE TRENCHING, BEDDING, AND BACKFILL STANDARD DETAIL DRAWINGS.
2. WATER AND SEWER LINES SHALL MAINTAIN A MINIMUM OF HORIZONTAL SEPARATION DISTANCE OF 10 FEET AT ALL TIMES. ANY DEVIATION SHALL BE CONSIDERED ON A CASE-BY-CASE BASIS. ANY WATER LINE CONSTRUCTED WITHIN 10 FEET HORIZONTALLY FROM SEWER LINES SHALL BE DUCTILE IRON.
3. WATER AND SEWER LINES SHALL MAINTAIN A MINIMUM VERTICAL SEPARATION OF 18 INCHES WITH THE WATER LINE CROSSING ABOVE THE SEWER LINE. ANY DEVIATION FROM THIS REQUIREMENT WILL BE CONSIDERED BY THE STATE HEALTH DEPARTMENT ON A CASE-BY-CASE BASIS, AND IF APPROVED, BOTH WATER AND SEWER LINES SHALL BE DUCTILE IRON FOR A 20 FOOT SECTION, TO BE CENTERED AT THE VERTICAL CROSSING.
4. WHERE A WATERLINE MUST UNAVOIDABLY PASS BENEATH A SEWER LINE, AT LEAST 18 INCHES OF SEPARATION MUST BE MAINTAINED AND BOTH WATER AND SEWER LINES SHALL BE DUCTILE IRON FOR A 20 FOOT SECTION, TO BE CENTERED AT THE VERTICAL CROSSING POINT.



DETAIL - WATER/SEWER LINE SEPARATION
N.T.S.
WA.1.2



N.T.S.
WA.1.3

CONCRETE BLOCKING DATA
THRUST PER LB. OF WATER PRESSURE
(COEFFICIENT)

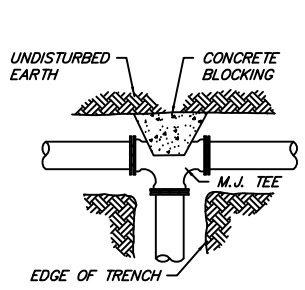
PIPE SIZE	DEAD END OR TEE	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND
2	4	5	3	2	1
3	7	10	6	3	2
4	13	18	10	5	3
6	21	40	22	11	6
8	59	84	39	20	10
10	79	112	61	31	16
12	112	160	87	45	23
14	154	219	119	61	31
16	200	285	155	79	40
18	253	361	196	100	51
20	313	446	242	123	62
22	378	539	292	149	75
24	450	642	348	177	90

BEARING STRENGTH OF SOILS

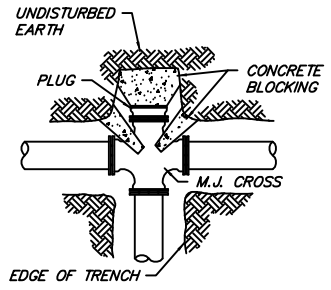
SOIL TYPE	SAFE BEARING LOAD, LBS./SQ. FT.
MUCK	0
SOFT CLAY	1,000
MEDIUM CLAY OR SAND	2,500
COMPACTED SAND	3,000
HARD CLAY	6,000
SHALE	10,000

NOTES:

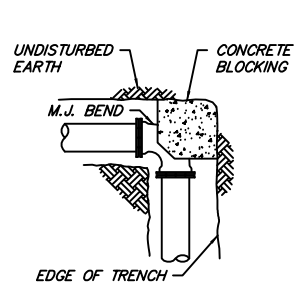
1. A PROPERLY DESIGNED RESTRAINT SYSTEM USING MEGA-LUG BY EBAA IRON OR APPROVED EQUAL MAY BE USED IN LIEU OF CONCRETE BLOCKING.
2. NO CONCRETE BLOCKING SHALL BE USED IF A RESTRAINT SYSTEM IS SHOWN ON THE PLANS.
3. AN ALLOWANCE FOR WATER HAMMER OF 50% OF THE PRESSURE CONDITION SHALL BE MADE IN SIZING ALL THRUST BLOCKS UNLESS OTHERWISE DIRECTED. FOR BENDS IN WHICH THE RESULTANT THRUST IS HORIZONTAL OR DOWNWARD, THE AREA OF UNDISTURBED TRENCH BACKING FOR THRUST BLOCKS SHALL BE IN ACCORDANCE WITH THE FOLLOWING FORMULA:
   SQ.FT. OF UNDISTURBED TRENCH BACKING = PRESSURE CONDITION X 1.5 COEFFICIENT / SAFE BEARING LOAD OF SOIL
4. THE MINIMUM AREA OF TRENCH BACKING FOR THRUST BLOCKS SHALL BE 1.0 SQ. FT. REGARDLESS OF SIZE GIVEN BY FORMULA.
   EXAMPLE: 90° BEND, 8" LINE, 100 PSI LINE PRESSURE, MEDIUM CLAY
   SQ. FT. OF TRENCH BACKING= 100 X 1.5 X 84 = 5.0 SQ. FT.
5. FOR VERTICAL BENDS IN WHICH THE RESULTANT THRUST IS UPWARD, THE THRUST BLOCK SHALL BE SIZED IN ACCORDANCE WITH THE FOLLOWING FORMULA:
   SIZE OF BLOCK(CU. FT.)= PRESSURE CONDITION X 1.5 COEFFICIENT
   EXAMPLE: 11-1/4" VERTICAL BEND WITH UPWARD THRUST, 16" PIPE 100 PSI, TYPE SOIL IS NOT CONSIDERED.
   SIZE OF BLOCK = 100 X 1.5 X 40 = 40 CU. FT.
6. THE STRAPS FOR VERTICAL BENDS SHALL BE OF GALVANIZED STEEL WITH MIN. DIMENSIONS OF 3/16" X 2-1/2". THE LENGTH OF THE STRAPS SHALL BE SUFFICIENT TO PROVIDE FOR 12" OF EMBEDMENT OF EACH END INTO THE CONCRETE BLOCK. THE END 2" OF THE STRAP SHALL BE BENT AT 90 DEGREES TO THE AXIS OF THE STRAP TO PROVIDE FOR ANCHORAGE. COSTS OF STRAPS IS TO BE INCLUDED IN THE UNIT PRICE FOR CONCRETE BLOCKING.



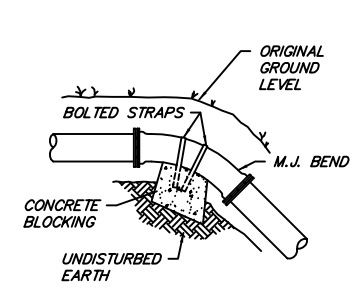
BLOCKING FOR TEES
N.T.S.
WA.1.4



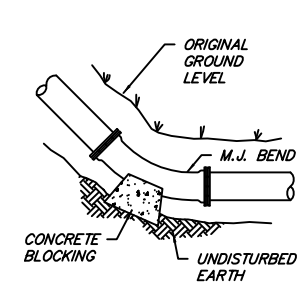
BLOCKING FOR CROSSES
N.T.S.
WA.1.5



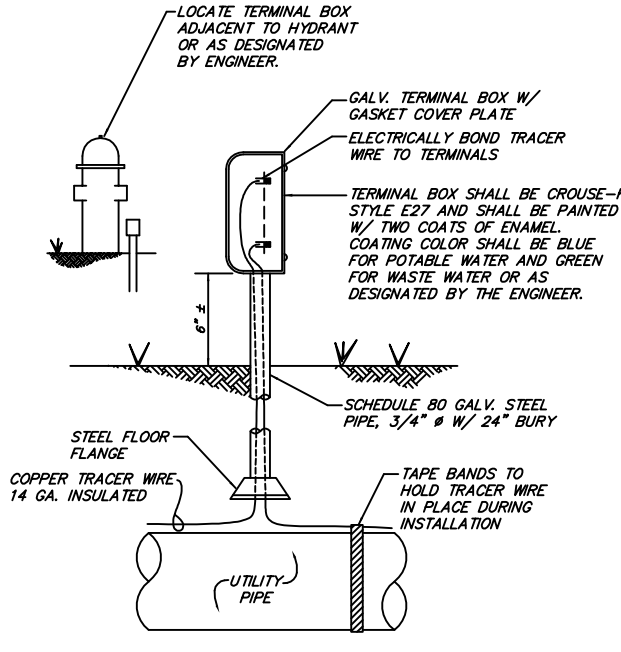
BLOCKING FOR BENDS
N.T.S.
WA.1.6



BLOCKING FOR BENDS
N.T.S.
WA.1.7



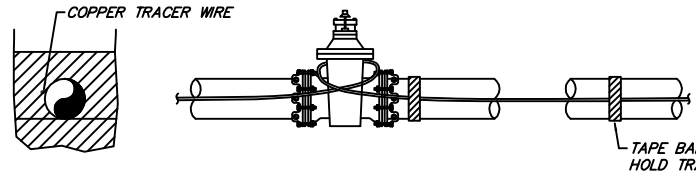
BLOCKING FOR BENDS
N.T.S.
WA.1.8



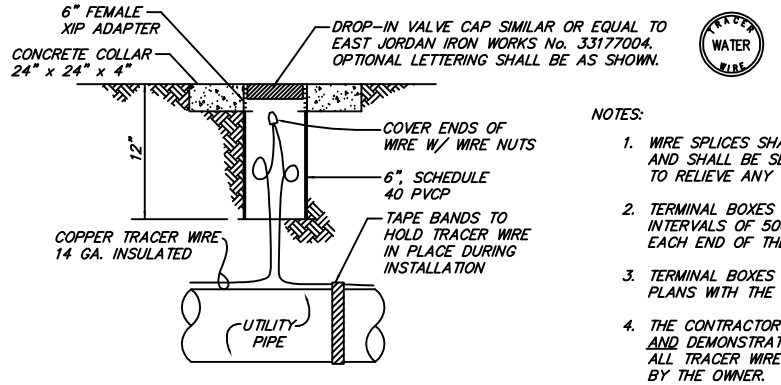
NOTES:

1. WIRE SPLICES SHALL BE ELECTRICALLY BONDED AND SHALL BE SECURED WITH SPLICING CLIPS TO RELIEVE ANY TENSION ON THE SPLICE.
2. TERMINAL BOXES SHALL BE LOCATED AT APPROX. INTERVALS OF 500' OF PIPE LENGTH, AND AT EACH END OF THE PIPING INSTALLATION.
3. TERMINAL BOXES SHALL BE LOCATED ON THE PLANS WITH THE SYMBOL "⚠".
4. THE CONTRACTOR SHALL PROVIDE AN INSTRUMENT AND DEMONSTRATE THE ELECTRICAL CONTINUITY OF ALL TRACER WIRES PRIOR TO THE FINAL ACCEPTANCE BY THE OWNER.
5. TRACER WIRE SHALL BE INSTALLED ON ALL PVC WATERLINES AND INSTALLED IN THE LOCATION DIRECTED BY THE ENGINEER BUT SHALL GENERALLY BE LOCATED IMMEDIATELY ADJACENT TO THE PIPE AND AT THE SAME DEPTH.

TRACER WIRE TERMINAL BOX "A"
N.T.S.
WA.1.9



TRACER WIRE DETAIL
N.T.S.
WA.1.10



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TRACER WIRE TERMINAL BOX "B"
N.T.S.
WA.1.11

Revision	Date	BY

Standard Drawings
WATER SYSTEM IMPROVEMENTS
Public Works Construction

The City of Fort Smith ARKANSAS

CITY OF FORT SMITH
Engineering Department
623 Garrison Avenue, Room 409
Fort Smith, Arkansas 72901
Phone (479)784-2225 Fax (479)784-2245

Project:	Details
Date:	NOV 2012
Scale:	As Shown
Drawn By:	RBR
Dwg. No.:	WA1
Sheet No:	38

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